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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,738	11/15/2001	Il Gweon Kim	041501-5415	7445

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EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 04/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/987,738

Applicant(s)

KIM, IL GWEON

Examiner

Binh X Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5-8 is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 24 January 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 1-24-2002 have been accepted. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

### *Specification*

2. The disclosure is objected to because of the following informalities: In page 12 lines 8-12, the applicant wrote, "a plurality of shaped nano-crystalline silicons (silicon quantum dots) 44 are formed on the tunneling insulating film 43 at a size of 5 nm by amorphous chemical vapor deposition" (emphasis added). The examiner does not understand this description at all. The examiner interprets that the term "crystalline" has the opposite meaning with the term "amorphous". Therefore, the examiner does not understand how any person can form a plurality of "crystalline" silicon by using an amorphous technique.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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4. Claims 3, 7 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In claim 3 and 7, the applicants write, "wherein the second insulating film and the nano-crystalline silicons are etched by etching the nano-crystalline silicons by about 10 nm". The examiner does not completely understand this limitation. The examiner interprets that there are two layers of material (i.e., second insulating film and the nano-crystalline silicons) will be etched. However, the applicants only disclose that the nano-crystalline silicons is etched by about 10 nm. For the purpose of the examination, the examiner will interpret that the total etched amount of both layers is about 10 nm.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Madhukar et al. (US 6,344,403).

Madhukar discloses a method comprising:

forming a first insulating film (14) on a semiconductor substrate (12);

forming a plurality of silicon crystalline nano-cluster (read on "nano-crystalline silicons"; Fig 6-9, col. 10 lines 26-35);

forming a second insulating film (20) on the first insulating film including the nano-oxidizing surfaces of the silicon crystalline nano-cluster (col. 13 lines 40-52, col. 13 lines 57-60);

partially etching the silicon insulating film and the silicon crystalline nano-cluster (Fig 14-15, col. 13 lines 40-67).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madhukar in view of Sugiyama (US 6,060,743).

Claim 2 differs from Madhukar by the specific size of the nano-crystalline silicons. In a semiconductor method, Sugiyama discloses the size of the nano-crystalline silicons

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is a result effective variable and it is range from 5-100 nm more specific about 30 nm (within applicants value, Table 2A-2B, 9). The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Midhukar in view of Sugiyama by perform routine to obtain an optimal nano-crystalline silicons size as an expected result.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madhukar in view of Winningham (US 6,518,194).

Claim 3 differs from Madhukar by the specific etching depth value. In a nano-structure method, Winningham discloses that the etching depth value is a result effective variable range from 0-450 nm (Fig 3-5). The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Midhukar in view of Sugiyama by perform routine to obtain an optimal etching depth value as an expected result.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madhukar in view of Ueda et al. (US 6,326,311).

Claim 4 differs from Madhukar by the specific oxidizing thickness value. In a semiconductor method, Ueda discloses that the oxidizing thickness value is a result effective variable having a value of 5 nm in one of the embodiment (Fig 15A-15C, col. 21 lines 21-30). The process of conducting routine experiments so as to produce an

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expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Madhukar in view of Ueda by perform routine to obtain an optimal oxidizing thickness value as an expected result.

***Allowable Subject Matter***

10. Claims 5-6, 8 are allowed.

11. Claim 7 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The cited prior arts fail to disclose the step of forming a second insulating film on the first insulating film including the nano-crystalline silicons in conjunction with the steps of forming a tunnel insulating film on the substrate; forming a plurality of nano-crystalline silicon on the tunnel insulating film, and forming a first insulating film on the tunnel insulating film and nano-crystalline silicons and other limitation in the claim.

***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

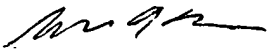
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on (703) 308-3836. The fax phone

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numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran  
March 31, 2003

  
BENJAMIN L. UTECH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700